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Pesticide Fact Sheet Number 149: Propanil

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

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EPA

Pesticide Fact Sheet

Name of Chemical: PROPANIL

Reason for Issuance: REGISTRATION STANDARD

Date Issued: DEC 23 1987

Fact Sheet Number: 149

1. Description of Chemical

Common Name: Propanil

Chemical Name: 3',4'-dichloropropionanilide

Other Names: Surcopur, Supur, Propanex, Propanilo, Supernox, FW-734, Stam, Stampede, DPA, Herbax, Riselect, Erban, Chem Rice, Rogue, S-10165, Strel, Bay 30130

OPP (Shaughnessy) Number: 028201

Chemical Abstracts Service (CAS) Number: 709-98-8

Empirical Formula: $C_9H_9Cl_2NO$

Molecular Weight: 218.1

Year of Initial Registration: 1962

Pesticide Type: Herbicide

U.S. and Foreign Producers: Rohm & Haas Company, Bayer AG, CIFA Laboratori Chemici, C.I.K. Australia Pty., Ltd., Crystal Chemical Inter-America, Cumberland International Corporation, Sintesul, Tifa, Ltd., Visplant-Chimiren S.r.l.

2. Use Patterns and Formulations

Application Sites: Rice, spring barley, oats and durum wheat.

Percent of Crop Treated With the Pesticide: Rice, 70 to 80 percent of total U.S. rice crop.

Percent of Pesticide Applied to Crop: (1) Rice, approximately 95 percent [9,000,000 to 11,000,000 pounds of active ingredient (ai)] of total domestic usage of propanil, (2) Wheat, barley oats, approximately 2 to 5 percent (less than 1,000,000 pounds ai) of total domestic usage of propanil.

Types and Methods of Application: Applied by conventional aerial or ground equipment as a postemergence application.

Pest Controlled: Grasses, broadleaf and aquatic weeds.

Application Rates: Rates range from 1.13 to 6 lb ai/A.

Types of Formulations:

Manufacturing-Use Products: 85, 90, and 96% ai.

End-Use Products: 33, 33.8, 35, and 35.9% ai (3 lb ai/gal) emulsifiable concentrate; 43.48, 43.5, 44.5, 45, and 45.4% ai (4 lb ai/gal) emulsifiable concentrate; 35% ai (3 lb ai/gal) soluble concentrate/liquid.

Usual Carriers: Water

3. Science Findings

Summary Science Statement: There are no acceptable data to assess acute toxicity. However, two invalid acute oral studies indicate Toxicity Category III for propanil. The chronic toxicity data were developed from testing three technicals of varying purity. Pending review of the impurity profiles of these technicals, certain studies may need to be repeated. Maternal and developmental toxicity no-observable-effect levels (NOEL) were established at 20 mg/kg/day in separate rat and rabbit teratology studies. In a rat reproduction study, a reproductive and systemic NOEL was established at 300 parts per million (ppm). Results of these three studies do not indicate any toxicological concerns. A supplementary mouse oncogenicity study conducted with 85.4% and 98% ai propanil was negative for oncogenic potential at 180 ppm (highest dose tested). Dose-related histologic findings were observed in the male liver and the NOEL for this lesion was 30 ppm for the 98% technical and the LEL was 180 ppm for both technicals. Bilateral retinal degeneration in male and female mice and thyroiditis in female mice were observed at 180 ppm with the 85.4% ai technical only. NOELs for these effects were not established and the mouse oncogenicity study did not employ the maximum tolerated dose. Therefore, this study is classified as supplementary data and further information, or a new mouse oncogenicity study is necessary. Propanil is not acutely toxic to birds on a dietary basis. The chemical is slightly to moderately toxic to estuarine and marine organisms and freshwater invertebrates. Propanil is moderately to very highly toxic to freshwater fish. The chemical may pose a risk to some endangered species. The environmental fate of propanil is not adequately understood. Available data indicate that propanil is stable to hydrolysis at pH 7 and 9.

Leaching studies indicate that the chemical is mobile to very mobile on sand loam, silt loam, clay loam, clay and sand soils. A ground water monitoring study may be required pending the results of mobility and soil field dissipation studies.

Chemical Characteristics:

Physical State: Solid

Color: Medium to dark grey

Odor: Mildly acrid

Melting Point: 89-92 °C

Density: 1.25 g/ml at 25 °C

Solubility: 0.002 g/ml in water, readily soluble in ketones, alcohols and chlorinated solvents.

Vapor Pressure: Less than 0.001 mmHg at 50 °C (97% ai), 9.1×10^{-7} torr at 25 °C (85% ai).

Octanol/Water Partition Coefficient: 193 (analytical grade, 99% ai)

Stability: Stable at room temperature. Strong acid or alkali will hydrolyze propanil to 3',4'-dichloroaniline and propionic acid.

Toxicological Characteristics:

The chronic toxicity data base was developed from testing three technicals ranging in purity from 85 to 98% ai. Pending review of the impurity profile of these technicals certain studies may need to be repeated.

° Teratology - Rat: Maternal and developmental toxicity NOEL is 20 mg/kg/day (85.4% ai)

° Teratology - Rabbit: Maternal and developmental toxicity NOEL is 20 mg/kg/day (85.4% ai)

° Reproduction - Rat: Reproductive and systemic NOEL is 300 ppm. There were no compound-related effects on fertility, gestation, pup viability and lactation, or sex ratios for each generation.

° Mutagenicity: Propanil was not mutagenic in gene mutation and chromosomal aberration assays, and in all but one direct DNA damage assay.

Major Routes of Exposure:

Mixers, loaders, and applicators would receive the most exposure via skin/eye contact and inhalation.

Physiological and Biochemical Behavioral Characteristics:

Foliar Absorption: Propanil is absorbed through the leaves.

Translocation: The chemical is translocated to the growing point and back to other leaves.

Mechanism of Action: Propanil inhibits a number of biochemical reactions, especially photosynthesis.

Environmental Characteristics:

Available data are insufficient to fully assess the environmental characteristics of propanil. Leaching studies indicate that the chemical is mobile to very mobile on sandy loam, silt loam, clay loam, clay and sand soils. Propanil is stable to hydrolysis at pH 7 and 9. Pending the results of anaerobic/aerobic soil metabolism, aquatic metabolism, and field dissipation studies, a ground water monitoring study may be required.

Ecological Characteristics:

° Avian Dietary Toxicity: 1924 ppm (bobwhite quail), greater than 5000 ppm (mallard duck)

° Freshwater Fish Acute Toxicity: Less than 3.7 to 5.36 ppm (bluegill sunfish), 2.3 ppm (rainbow trout)

° Aquatic Invertebrate Acute Toxicity: 6.7 ppm (Daphnia magna)

Potential problems related to endangered species: The use of propanil on rice may pose a hazard to endangered aquatic species. The Agency is consulting with the U.S. Fish and Wildlife Service to determine whether the fat pocketbook pearly mussel (Potamilus capax) may be at jeopardy from the use of propanil on rice. After U.S. Fish and Wildlife Service review, the Agency may impose labeling requirements to protect endangered species.

Tolerance Assessment:

Tolerances have been established for residues of propanil in or on the following raw agricultural commodities (RACs):

Commodity	Tolerance (ppm)
Barley, grain	0.2
Barley, straw	0.75
Cattle, fat	0.1 (N)[1/]
Cattle, mbyp[2/]	0.1 (N)
Cattle, meat	0.1 (N)
Eggs	0.05 (N)
Goats, fat	0.1 (N)
Goats, mbyp	0.1 (N)
Goats, meat	0.1 (N)
Hogs, fat	0.1 (N)
Hogs, mbyp	0.1 (N)
Hogs, meat	0.1 (N)
Horses, fat	0.1 (N)
Horses, mbyp	0.1 (N)
Horses, meat	0.1 (N)
Milk	0.05 (N)
Oats, grain	0.2
Oats, straw	0.75
Poultry, fat	0.1 (N)
Poultry, mbyp	0.1 (N)
Poultry, meat	0.1 (N)
Rice	2
Rice, straw	75 (N)
Sheep, fat	0.1 (N)
Sheep, mbyp	0.1 (N)
Sheep, meat	0.1 (N)
Wheat, grain	0.2
Wheat, straw	0.75

A feed additive tolerance of 10 ppm is established for propanil in or on rice bran, rice hulls, rice polishings and other milling fractions resulting from application of the herbicide to the growing RAC rice.

1/ The designation "(N)", standing for negligible residues, will be deleted from this entry since it is no longer used by the Agency.
2/ Meat byproducts

Dietary Assessment: The provisional acceptable daily intake (PADI) was based on a 2-year rat feeding study. The NOEL for the rat study was 5 mg/kg/day. An uncertainty factor of 1000 was used to account for the inter- and intraspecies differences and the toxicology data gaps. The PADI was obtained by dividing the NOEL by the uncertainty factor of 1000. The resultant PADI was 0.005 mg/kg/day. The theoretical maximum residue contribution (TMRC) of propanil to the daily diet of the U.S. population is 0.0015 mg/kg/day, based on the existing tolerances, with 29% of the PADI being utilized.

Reported Pesticide Incidents: A well documented drift incident occurred in California where propanil was applied to extensive acreage of rice in the Sacramento Valley and resulted in phytotoxicity to plum trees up to 40 miles away. California has disallowed use of propanil in specified geographic areas, requires permits for application in other areas, and has imposed application equipment requirements and meteorological conditions for application. Propanil is considered a "restricted herbicide" in California State Regulations.

4. Summary of Regulatory Positions

The following Agency positions are summarized from the Propanil Registration Standard.

- The Agency is not initiating a Special Review of propanil at this time.
- The Agency will not establish significant new food uses until residue and chronic health effects data are submitted and reviewed.
- The Agency is not imposing reentry requirements at this time.
- Tolerances for residues in catfish and crayfish must be proposed and supporting data submitted. In lieu of proposing tolerances for catfish and crayfish, label restrictions may be implemented.
- The Agency has determined that label restrictions on rice drainage water must be implemented.
- If available rice processing studies are determined to be adequate, then the registrant must propose a method to make consistent, the feed additive tolerance and the expected residues in rice bran.
- The registrant must propose a method to make consistent, the tolerance for residues in or on barley, oats and wheat straw and the expected residues for these commodities if available straw data for these commodities are determined to be adequate.

° The Agency will initiate steps to delete the designation "(N)" from the tolerances listed in 40 CFR 180.274.
° The Agency is requiring product chemistry data on each technical grade propanil product.
° The Agency has determined that product chemistry and metabolism data will be immediately reviewed upon receipt.

Use, Formulation or Geographic Restrictions: No significant new food or feed uses of propanil will be permitted until residue chemistry and chronic toxicology data are available to assess existing uses.

Unique Label Warning Statements: End-use products shall bear the following statements as applicable:

a. End-use products with aquatic uses:

(1) This pesticide is toxic to fish. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not apply directly to water except as specified on this label. Do not contaminate water by cleaning of equipment or disposal of wastes.

(2) Water drained from treated rice fields must not be used to irrigate other crops or released within 1/2 mile upstream of a potable water intake in flowing water (i.e., river, stream, etc.) or within 1/2 mile of a potable water intake in a standing body of water such as a lake, pond, or reservoir.

b. The following statements must appear on end-use products labeled for aquatic uses, if the registrant of the product chooses not to conduct tests and propose tolerances for catfish and crayfish:

(1) Do not drain water from treated fields into areas where catfish farming is practiced.

(2) Do not apply to fields where commercial crayfish farming is practiced and do not drain water from treated fields into areas where crayfish farming is practiced.

c. End-use products with nonaquatic uses:

This pesticide is toxic to fish. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Do not contaminate water by cleaning of equipment or disposal of wastes.

5. Summary of Major Data Gaps

Product Chemistry

All Product Chemistry data.

Residue Chemistry

Metabolism Studies (plant, livestock)
Residue Analytical Method (plant and animal residues)
Storage Stability
Residue Studies

Toxicology

Acute Oral
Acute Dermal
Acute Inhalation
Eye Irritation
Dermal Irritation
Dermal Sensitization
21-Day Dermal
Chronic Toxicity (rodent and nonrodent)
Oncogenicity (rat and mouse)
General Metabolism

Environmental Fate

Hydrolysis
Photodegradation (water and soil)
Aerobic Soil Metabolism
Anaerobic Soil Metabolism
Anaerobic Aquatic Metabolism
Aerobic Aquatic Metabolism
Leaching, Adsorption/Desorption
Soil Dissipation

Aquatic (Sediment) Dissipation
Rotational Crop (Confined) Accumulation
Irrigated Crops Accumulation
Fish Accumulation

Fish and Wildlife

Avian Acute Oral
Avian Subacute Dietary (upland game bird and waterfowl)
Freshwater Fish Toxicity [TEP] (coldwater fish and warmwater fish)
Freshwater Invertebrates Acute Toxicity [TEP]
Estuarine and Marine Organisms Acute Toxicity
Fish Early Life Stage and Aquatic Invertebrate Life Cycle
Fish Life Cycle

Plant Protection

Seed Germination/Seedling Emergence
Vegetative Vigor
Aquatic Plant Growth

6. Contact Person at EPA

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DISCLAIMER: The information presented in this Pesticide Fact Sheet is for informational purposes only and may not be used to fulfill data requirements for pesticide registration and reregistration.